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Implementing Integrated Testing

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Current Department of Defense (DoD) acquisition policy mandates the use of integrated testing. The policy not only makes economic sense but also has the potential to reduce risk, as early, integrated testing often involves more realistic operational scenarios than traditional developmental testing and therefore allows earlier discovery of operational failure modes. As more programs have attempted to implement the policy, however, they have encountered obstacles that have prevented them from fully realizing the benefits of integrated testing. Issues that present difficulty in integrated testing fall into three principal areas: sharing and access to data; shared control of test events; and overreaction by some observers to the test results. I believe the real obstacles to fully implementing integrated testing are mostly cultural and can be overcome with appropriate action by acquisition leaders.

DoD policy memos and guidance documents define what we mean by "integrated testing." The Defense Acquisition Guidebook, Test and Evaluation (T&E) chapter (chapter 9) provides the formal definition and additional detail. The definition focuses on collaborative planning and execution of tests to provide a shared or common data set for independent evaluations and reporting. It is important to note that the definition is not "*integrated test and evaluation*" but "*integrated testing*." Although the testing is planned and executed collaboratively by the contractor, government Developmental Test (DT) and Operational Test (OT) communities, the evaluations are performed independently to fulfill respective roles and missions.

The challenges regarding sharing and access to data seem to be associated largely with ensuring the pedigree of the data and proprietary issues with contractor data. As defined, integrated testing includes contractor testing and can result in claims of proprietary data rights. In order to share the data from contractor events, provisions for data access must be included in program contracts. The converse is also true if contractors are expected or allowed to use data collected during government test events. Discussing

data access issues up front, before the contract is signed, can set the expectation and allow for an equitable arrangement for obtaining access to contractor data. In order to assist programs with these types of T&E contractual matters, my office has produced a guide, "Incorporating Test and Evaluation into Department of Defense Acquisition Contracts" (<http://www.acq.osd.mil/sse/pg/guidance.html>).

Ensuring the pedigree of the data refers to understanding the configuration of the test asset and the actual test conditions under which each piece of data was obtained. While the primary purpose of integrated testing is to increase the value and efficiency of test events, the practice of sharing data also

could result in a reduction in the acquisition timeline if we use shared data to satisfy multiple objectives. By infusing operationally relevant profiles and a mission perspective during integrated testing, and establishing and maintaining the data pedigree, much of the data needed by the Operational Test Agency (OTA) could be obtained before Initial Operational Test and Evaluation (IOT&E). If the data collected during integrated testing is adequate, it could serve to shorten the dedicated OT&E phase.

The issue with shared control of test events appears to be acceptance and use of data captured from test events outside the evaluator's sole control. It is easy to have confidence in data from a test you controlled. If tests are planned and conducted collaboratively, though, all stakeholders (both DT and OT) have control of the event, and all should be able to accept the data from the tests. The independence of the separate evaluation is not compromised by the fact that the source of the data was an integrated event.

Another issue is the potential overreaction by observers to test results. Many program managers view problems discovered during testing as bad news. Most understand that T&E results are important in maturing the system design through the systems engineering process, but reports of problems discovered in early testing could be misinterpreted by outside observers. The potential for these misunderstandings



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creates a disincentive to stress the system early. It creates an incentive to perform DT in tightly scripted scenarios in order to demonstrate successful system operation. Unfortunately, this conduct merely postpones the discovery of operational failure modes, resulting in expensive rework and causing disruption to program schedules. We need the acquisition and user communities to realize that the product of T&E is knowledge about the system's capabilities and/or limitations, not problems. Testers and evaluators must develop knowledge that is relevant and timely for the decisions being made, and report results in a mission-oriented context. Ultimately, we need comprehensive knowledge from T&E results to assist in managing risks and better decision making.

Integrated testing holds a promise of greater testing efficiencies and improving the quality of the information provided to the decision makers. The challenge to the T&E community is to implement robust integrated testing and change the culture to fully realize the benefits to the acquisition process and ultimately to the warfighters. □

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